

# Infected pseudoaneurysms in intravenous drug abusers: Ligation or reconstruction?

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## ABSTRACT

**Background:** Infected pseudoaneurysm in intravenous (IV) drug abusers is a serious clinical problem, with difficult and controversial management. With existing controversies regarding their optimal management, we present the results of simple ligation and local debridement for treatment of infected pseudoaneurysms. **Patients and Methods:** Records of 72 consecutive patients with pseudoaneurysms in IV drug abusers over the last 20 years were reviewed retrospectively. **Results:** Ligation and excision of pseudoaneurysm was done in all patients with delayed revascularization in only two patients. Four patients had amputations because they had gangrenous limbs on presentation. All other patients had healthy limbs at the time of discharge. There were three deaths, two due to sepsis with multiorgan dysfunction and one with hemorrhagic shock. **Conclusion:** Infected pseudoaneurysm should be managed by simple ligation of involved artery with delayed revascularization, if required.

**Key words:** Delayed revascularization, drug abuser, infected pseudoaneurysm, ligation

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## INTRODUCTION

Intravenous (IV) drug abuse is an increasing social and health problem.<sup>[1]</sup> Repeated punctures under septic conditions along with needle sharing habits among IV drug abusers result in various vascular complications.<sup>[2]</sup> In addition, patients who present with these complications frequently have viral infections, which are hazardous to healthcare workers.<sup>[3]</sup> Recently, there is an increase in incidence of these complications. Infected femoral artery pseudoaneurysms are one of the most common arterial complications in IV drug abusers.<sup>[4]</sup> This situation cannot only be limb-threatening, but also be life-threatening and poses a difficult management

problem for vascular surgeons all over the world.<sup>[5,6]</sup> Excision and ligation of affected artery along with local debridement is traditional treatment for this difficult problem.<sup>[7,8]</sup> Intermittent claudication and sometimes amputation is associated with this treatment.<sup>[9]</sup> Therefore, some vascular surgeons, advocate a more aggressive approach including concomitant revascularization using synthetic or autogenous vein grafts sited either intra- or extra-anatomically.<sup>[10,11]</sup> Some vascular surgeons have adopted a more conservative approach towards revascularization as a delayed procedure.<sup>[12]</sup> With these existing controversies of optimal surgical management of infected pseudoaneurysm, we reviewed the epidemiology of pseudoaneurysm, surgical techniques used for their treatment and their clinical outcome in a population of IV drug abusers of northern India.

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## PATIENTS AND METHODS

This is a retrospective descriptive study, covering the period from January 1989 to December 2008 from a tertiary care center of northern India. Medical records of 72 consecutive patients who presented with pseudoaneurysms due to IV drug abuse were reviewed. Data regarding demography, age, gender, period of IV drug abuse, site of injection, presentation, surgical management, and outcome was analyzed.

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## RESULTS

In this 20-year study period, all patients were males excepting one lady who had a brachial pseudoaneurysm. The mean age  $\pm$  standard deviation (SD) of patients was  $32.7 \pm 9.6$  (range 18-72) years [Table 1]. Out of 72, 17 patients were unemployed and one was a student. The mean duration of IV drug abuse was  $27.3 \pm 11.2$  months [Table 2]. 48.6% patients were abusing a single drug. Buprenorphine (51%), morphine (43%), benzodiazepines (22.2%), pentazocine (16.6%), promethazine HCL (16.6%), and pheniramine maleate (6.9%) were most commonly abused drugs. Self injection (84.4%) was commonest mode of injection. Sixty-one patients had femoral, eight had brachial, two had radial, and one had an axillary pseudoaneurysms [Table 3]. Ten patients were hepatitis C virus (HCV) positive out of which two were also hepatitis B surface antigen (HbsAg) positive. Four patients were human immunodeficiency virus (HIV) positive. Table 4 summarizes the history, physical findings, and chief presenting features of the 72 patients who were included in this study. Twenty-four patients presented with ruptured pseudoaneurysm with life-threatening hemorrhage. Eleven patients presented with oozing pulsating mass. Twenty patients presented with infected pulsatile mass. Seventeen patients were misdiagnosed as groin abscess outside. Incision and drainage in these patients was followed by arterial bleeding. Forty-three patients had positive wound swab cultures and seven patients had a positive blood culture. *Staphylococcus aureus* (36.9%), *Pseudomonas* (19.7%), *Escherichia coli* (15.5%), *Streptococcus* (4.1%), and *Acinetobacter* (4.1%) were commonly isolated organisms. We performed ligation and excision in all patients with delayed revascularization in two patients. This was achieved with extra-anatomical obturator bypass with a synthetic polytetrafluoroethylene (PTFE) graft in one case and vein graft in other case. Seventeen patients showed signs of claudication which was mild in nature and was not affecting patient's lifestyle and daily routine. Two patients who had severe claudication after ligation of the affected artery were readmitted for revascularization. It was done after 4 weeks in one patient and after 3 months in other patient. Both were symptomatically better after revascularization. Four affected lower limbs required amputation after ligation and excision of the pseudoaneurysm, all of them had gangrenous changes at the time of admission. Of these four patients, two died with sepsis leading to multiorgan dysfunction syndrome. One patient died due to hemorrhagic shock following incisional drainage of infected pseudoaneurysm done outside. He had hemoglobin of 1.6 gm/dl on admission. He was immediately taken up for ligation. He went into disseminated intravascular coagulation (DIC) and died on 2<sup>nd</sup> postoperative day. Forty-three patients had an uneventful recovery [Table 5].

**Table 1: Age and sex distribution**

| Age (years) and sex distribution | 10-20 years | 20-30 years | 30-40 years | >40 years | Total |
|----------------------------------|-------------|-------------|-------------|-----------|-------|
| Male                             | 4           | 32          | 23          | 12        | 71    |
| Female                           | 0           | 0           | 1           | 0         | 1     |
| Total                            | 4           | 32          | 24          | 12        | 72    |
| Percentage                       | 5.56        | 44.44       | 33.33       | 16.67     | 100   |

**Table 2: Duration of drug abuse**

| Duration of abuse (months) | No. of patients | Percentage |
|----------------------------|-----------------|------------|
| $\leq 12$                  | 3               | 4.17       |
| 12-14                      | 17              | 23.61      |
| 24-36                      | 37              | 51.39      |
| >36                        | 15              | 20.83      |

**Table 3: Distribution of injection site**

| Injection site | No. of patients | Percentage |
|----------------|-----------------|------------|
| Femoral        | 61              | 84.72      |
| Brachial       | 8               | 11.11      |
| Radial         | 2               | 2.78       |
| Axillary       | 1               | 1.39       |

**Table 4: History and physical findings of patients with infected pseudoaneurysm**

| Findings   | No. of patients | Percentage |
|--|-----------------|------------|
| History  |                 |            |
| Swelling   | 67              | 93.06      |
| Pain and/or tenderness   | 55              | 76.39      |
| Bleeding   | 52              | 72.22      |
| Fever and chills   | 26              | 36.11      |
| Purulent discharge   | 23              | 31.94      |
| Specific presenting feature  |                 |            |
| Ruptured pseudoaneurysm with hemorrhage  | 24              | 33.33      |
| Oozing pulsating mass  | 11              | 15.28      |
| Infected pulsating mass  | 20              | 27.78      |
| Bleeding following incision and drainage of groin abscess (misdiagnosed outside) | 17              | 23.61      |
| Physical examination   |                 |            |
| Inflammation   | 55              | 76.39      |
| Pulsatile mass   | 31              | 51.39      |
| Limb edema   | 21              | 29.17      |
| Bruit  | 31              | 43.06      |
| Thrill   | 16              | 22.22      |
| Gangrenous changes   | 4               | 5.56       |

**Table 5: Outcome in patients with infected pseudoaneurysm following ligation and excision**

| Complications   | No. of patients | Percentage |
|---|-----------------|------------|
| Mild claudication                                       | 17              | 23.61      |
| Severe claudication requiring delayed revascularization | 2               | 2.77       |
| Amputation  | 4               | 5.55       |
| Sepsis  | 2               | 2.77       |
| Hemorrhage  | 1               | 1.38       |
| Mortality   | 3               | 4.16       |
| Uneventful recovery                                     | 43              | 59.72      |

## DISCUSSION

The most common arterial complication is infected pseudoaneurysm of femoral artery in IV drug abusers.<sup>[13,14]</sup> The tendency to inject in the groin area is highest as compared to other sites.<sup>[15]</sup> Patients usually present late with complications like bleeding, sepsis, and limb ischemia due to socioeconomic problems. Among the patients studied, the first site of approach for IV access in most cases was cubital fossa, but the site most affected with pseudoaneurysm was the groin. Seventeen patients were wrongly diagnosed outside as groin abscess and underwent incision and drainage which led onto devastating bleeding in these patients. Previous studies also revealed that if general practitioners are not aware of the clinical findings of infected pseudoaneurysm, then this diagnosis can be missed.<sup>[2,7]</sup> The pathogenesis of these pseudoaneurysms in IV drug abusers consists of introduction of infected material by nonsterile techniques combined with inadvertent or intentional arterial trauma when venous access is impossible because of thrombosis.<sup>[16]</sup> If left untreated, they can lead to hemorrhage, sepsis, limb loss, and even death.<sup>[17]</sup> There is also high incidence of HIV/HbsAg/HCV because of needle sharing habits. We found broken needle tips in seven patients adjacent to the site of femoral pseudoaneurysm due to intense fibrosis. X-ray of the site of aneurysm should always be done as a precautionary measure to avoid any needle prick during surgery. Almost all the patients were males (98.61%) correlating with high prevalence of male IV drug abusers. Mean age in this study population was 32.7 years, which is corresponding to most of the previous studies. Arterial pseudoaneurysms from self-injection of drugs occur most commonly in the groin region. The most common presentations were bleeding, either spontaneous or followed by incision and drainage.

The surgical treatment of these pseudoaneurysms remains challenging and controversial. Current treatment options include:

- (1) Excision and debridement of infected pseudoaneurysms with ligation of affected artery without revascularization<sup>[3,8,12,15,18]</sup>
- (2) Extensive debridement of infected pseudoaneurysms with routine revascularization.<sup>[11,14,16,17]</sup>

This revascularization can be achieved with an autogenous or synthetic graft placed either *in situ* or extra-anatomically.<sup>[10,16]</sup> Excision of pseudoaneurysm without arterial reconstruction has been reported by several authors as a viable option. In a study by Arora *et al.*,<sup>[8]</sup> simple arterial ligation without reconstruction was done without any associated amputation and only mild claudication. Reddy<sup>[15]</sup> carried out arterial ligation in 39 patients with two (5%) postoperative amputations.

Choice of graft is also a challenging issue, if revascularization is to be attempted. Great saphenous vein, because of prolonged direct injections, is usually not available as a conduit. Consequently, use of prosthetic graft seems unavoidable. These are usually associated with high reinfection risk even when placed in extra-anatomic route through obturator foramen. These drug dependent patients can also abuse these reconstructed vessels which is of grave consequences.<sup>[19]</sup>

We performed excision and ligation in all patients with delayed revascularization in only two patients. There were four amputations in this study, but these four patients had ischemic compromised limbs at the time of presentation. All other patients had healthy limbs at the time of discharge. Seventeen patients showed signs of claudication which was mild in nature and was not affecting patient's lifestyle and daily routine. Delayed revascularization was done in two patients who had severe claudication after ligation.

## CONCLUSION

Vascular complications caused by IV drug abuse are on the increase with infected pseudoaneurysms affecting femoral arteries as the commonest one. High index of suspicion for infected pseudoaneurysm helps in their timely diagnosis and management. Its awareness among general practitioners and surgeons should be encouraged so that vascular complications are managed appropriately. Infected pseudoaneurysms should be managed by simple ligation and excision of involved vessel with delayed revascularization when required. Early reconstruction is not recommended since most of pseudoaneurysms are infected at the time of presentation. IV drug abusers have tendency to reuse reconstructed vessels because of easy access to extra-anatomically placed subcutaneous grafts and the arterial reconstruction may be in jeopardy of recurrent infection and can be threat to life. Consequently, ligation is the optimal management of infected pseudoaneurysm in IV drug abusers.

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